

Chemistry Quiz
Welcome to Chemistry
Instructor's Version

Answers to Section I (Multiple Choice)

1.	C
2.	D
3.	A
4.	E
5.	B
6.	D
7.	B
8.	D
9.	C
10.	D

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Answers to Section II (Free Response)

Time Limit: Students have 30 minutes to complete this section.

Scoring: 60 points total; question 1 is worth 30 points and question 2 is worth 30 points; points for each section are indicated within the question.

Calculator Use: Students may use a calculator for these questions.

- 1. Describe how you would separate a mixture of water, cyclohexanol, and lead shavings. (Water boils at 100° C and cyclohexanol boils at 161°C.) Classify each mixture and the components at each step of the separation protocol as a heterogeneous mixture, a homogeneous mixture, an element, or a compound. (30 points)**

Answer:

The original solution containing water, cyclohexanol, and lead shavings is a heterogeneous mixture. The solid lead, an element, can be separated from the homogeneous liquid mixture by filtration. The lead shavings will be caught on the filter, while the liquid will pass through and can be captured in a clean flask or beaker.

The water and cyclohexanol form a homogeneous mixture of liquids. Each is a compound. Distillation should be used to separate them. The water will boil off at 100°C and can be captured in a clean container. The cyclohexanol will be left in the original container, or else it can be boiled off at 161°C and captured in another clean container. The three compounds are now separated.

- 2. The following four isotopes of iron are the only ones found in nature on earth:**

Isotope	Percent Abundance	Atomic Mass
Iron-54	5.82%	53.9396
Iron-56	91.66%	55.9349
Iron-57	2.19%	56.9354
Iron-58	0.33%	57.9333

- A. Write the nuclide symbol for each isotope, showing both the mass number and the atomic number. (15 points)**

Answer:

The symbol for the element iron is Fe. The atomic number for iron is 26, which can be found in the periodic table. The mass number is the number that follows the name of the element in the above table.

54

Fe

26

56

Fe

26

57

Fe

26

58

Fe

26

- B. Calculate the average atomic mass for the element iron from the data in the table. (15 points)**

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Answer:

The average atomic mass is the average of the element's isotopes, weighted by natural abundance.

$$\begin{array}{r} (.0582 \times 53.9396) \\ (.9166 \times 55.9349) \\ (.0219 \times 56.9354) \\ + (.0033 \times 57.9333) \\ \hline \mathbf{55.8 \text{ amu}} \end{array}$$